IN THE CLAIMS

Please amend the claims as follows:

Claims 1-15 (Canceled)

Claim 16 (Currently Amended): A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step; [and]

a third step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{\nu}, \hat{\theta})$ of the phase rotation (ν) and the angle of arrival (θ); and

a fourth step of forming a beam using said array pointed in a direction based upon said angle of arrival,

wherein the first step comprises, for each signal received (x_l), minimizing a distance between a plurality of values of the received signal (x_l) taken at a plurality of times (t) and values of a pilot signal (b) taken at said plurality of times (t).

Claim 17 (Previously Presented): The estimation method according to Claim 16, wherein the first step comprises estimating the total phase difference ξ_l of the signal x_l received by the antenna l by the following equations:

$$\hat{\xi}_l = Arc\tan\left(\frac{S_l^1 - S_l^2}{S_l^3 + S_l^4}\right) \text{ where}$$

$$S_l^1 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^1(t).b_R(t),$$

$$S_l^2 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^R(t).b_I(t),$$

$$S_l^3 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^R(t).b_R(t), \text{ and}$$

$$S_l^4 \stackrel{\Delta}{=} \sum_{t=1}^{T} x_l^1(t).b_I(t)$$

where $x_l^R(t)$ and $x_l^1(t)$ are respectively a real part and an imaginary part of a value of the signal x_l received in antennae l at t, $b_R(t)$ and $b_I(t)$ are real and imaginary parts of a value of the pilot signal b at the time t, and T is a time window length.

Claim 18 (Currently Amended): A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step; [and]

a third step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{\nu}, \hat{\theta})$ of the phase rotation (ν) and the angle of arrival (θ);

<u>and</u>

<u>a fourth step of forming a beam using said array pointed in a direction based upon said angle of arrival,</u>

wherein the second step comprises removing an ambiguity in the total phase difference values sequentially from one antenna to another antenna starting from a reference antenna of the array.

Claim 19 (Previously Presented): The estimation method according to Claim 18, wherein the step of removing of an ambiguity comprises using an affine relationship between the total phase difference and a rank of a respective antenna in the array.

Claim 20 (Currently Amended): A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step; [and]

a third step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{\nu}, \hat{\theta})$ of the phase rotation (ν) and the angle of arrival (θ)<u>;</u> <u>and</u>

<u>a fourth step of forming a beam using said array pointed in a direction based upon said angle of arrival,</u>

wherein the second step comprises estimating the phase rotation (ν) and the angle of arrival (θ) from a linear regression of estimated values of the total phase differences.

Claim 21 (Previously Presented): The estimation method according to Claim 20, wherein said second step comprises estimating the phase rotation (v) and the angle of arrival (θ) by minimizing a distance $J(v,\varphi)=\sum_{l=1}^{L}(v+(l-1).\varphi-\hat{\xi}_l)^2$, where $\hat{\xi}_l$ is an estimated value of the total phase difference of the signal received by the antenna of rank l, and $\varphi = 2\pi.\cos(\theta).d/\lambda$ where d is a pitch of the array, λ is a wavelength of the signal, and L is a number of antennae in the array.

Claim 22 (Currently Amended): A method of estimating a channel and a direction of arrival (θ) of a signal received by an array of antennae after being propagated along at least one path, comprising, for each path:

a first step of estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

a second step of estimating the angle of arrival (θ) of the signal, as well as a phase rotation (v) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step;

a third step of estimating a new value ($\tilde{\xi}_l$) of the total phase difference for each antenna l in the array, by using the estimated values of the phase rotation ($\hat{v}$) and the angle arrival ($\hat{\theta}$); [and]

a fourth step of estimating an attenuation (α) undergone by the signal along the at least one path from estimated values ($\hat{v},\hat{\theta}$) of the phase rotation (v) and the angle of arrival (θ); and

a fifth step of forming a beam using said array pointed in a direction based upon said angle of arrival.

Claim 23 (Previously Presented): The estimation method according to Claim 22, wherein the fourth step comprises minimizing a distance between a plurality of values of the signal (x_l) taken at a plurality of times (t) and values of a phase-shifted pilot signal (b) taken at said plurality of times (t).

Claim 24 (Canceled)

Claim 25 (Currently Amended): A signal reception device comprising an array of antennae and a corresponding plurality of estimation means each of said plurality of estimation means ~~adapted to implement the steps recited in one of the preceding claims~~, each of said plurality of estimation means comprising:

means for estimating for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

means for estimating the angle of arrival (θ) of the signal, as well as a phase rotation (ν) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step;

means for estimating an attenuation (α) undergone by the signal along the at least one path from estimated values ($\hat{\nu}, \hat{\theta}$) of the phase rotation (ν) and the angle of arrival (θ), and

at the output of each antenna, a plurality of filters, each adapted to different signal propagation paths; wherein

each of said plurality of estimation means is associated with a path (i) and is configured to receive an output of a corresponding filter.

Claim 26 (Previously Presented): The signal reception device according to Claim 25, comprising:

a plurality of beam formation means, each beam formation means being associated with a path (i) and configured to receive from a corresponding estimation means associated with the said path, an estimate $\hat{\theta}_i$ of an angle of arrival of the said path.

Claim 27 (Previously Presented): The signal reception device according to Claim 26, wherein each beam formation means is also configured to receive from an estimation means other than the corresponding estimation means an estimate $(\hat{\theta}_i, i' \neq i)$ of an angle of arrival of another path.

Claim 28 (Previously Presented): The signal reception device according to Claim 26, comprising a plurality of complex multiplication means, each complex multiplication means being associated with a path (i) and configured to multiply an output of a corresponding beam formation means by a complex coefficient $\alpha_i e^{-jv_i}$, where $\hat{v}_i$ and $\hat{\alpha}_i$ are estimated values of a phase rotation and of an attenuation coefficient, respectively, supplied by the corresponding estimation means.

Claim 29 (Canceled):

Claim 30 (Currently Amended): A signal reception device comprising an array of antennae and a corresponding plurality of estimators ~~each of said plurality of estimators~~

~~adapted to implement the steps recited in one of the preceding claims~~, each of said plurality of estimators comprising:

an estimator configured to estimate for each antenna (l) in the array of antennae a total phase difference (ξ_l) from a signal (x_l) received by each antenna (l);

an estimator configured to estimate the angle of arrival (θ) of the signal, as well as a phase rotation (v) undergone by the signal along the at least one path, using each of the antennae total phase differences determined in the first step;

means for estimating an attenuation (α) undergone by the signal along the at least one path from estimated values $(\hat{v}, \hat{\theta})$ of the phase rotation (v) and the angle of arrival (θ); and

at the output of each antenna, a plurality of filters, each adapted to different signal propagation paths,

wherein each of said plurality of estimators is associated with a path (i) and is configured to receive an output of a corresponding filter.

Claim 31 (Previously Presented): The signal reception device according to Claim 30, comprising:

a plurality of beam formers, each beam former being associated with a path (i) and configured to receive from a corresponding estimator associated with the said path, an estimate $\hat{\theta}_i$ of an angle of arrival of the said path.

Claim 32 (Previously Presented): The signal reception device according to Claim 31, wherein each beam former is also configured to receive from an estimator other than the corresponding estimator an estimate $(\hat{\theta}_i, i' \neq i)$ of an angle of arrival of another path.

Claim 33 (Previously Presented): The signal reception device according to Claim 31, comprising a plurality of complex multipliers, each complex multiplier being associated with a path (i) and configured to multiply an output of a corresponding beam former by a complex coefficient $\alpha_i e^{-jv_i}$, where $\hat{v}_i$ and $\hat{\alpha}_i$ are estimated values of a phase rotation and of an attenuation coefficient, respectively, supplied by the corresponding estimator.